



NEUROTOUCH

*Team: Mazen Aljawi, Brooke Deans, Christina Gibbs,
Matt Harlow, and Brendan Souvenir*

Clients: Dr. Martin, Dr. Maughan

Faculty: Dr. Shrestha, Dr. Schiele, Dr. Joyner

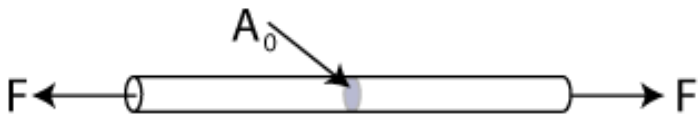
PROBLEM

What is currently being observed in the operating room?

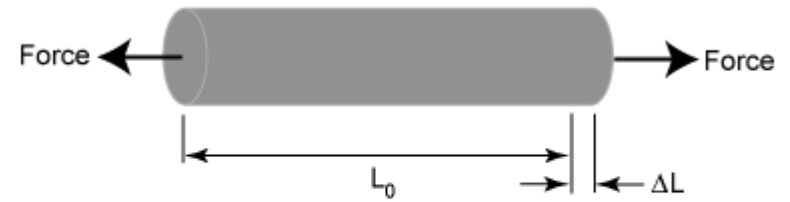


1. Judgement call
2. Lack of quantifiable tool to detect mechanical properties

MECHANICAL PROPERTIES

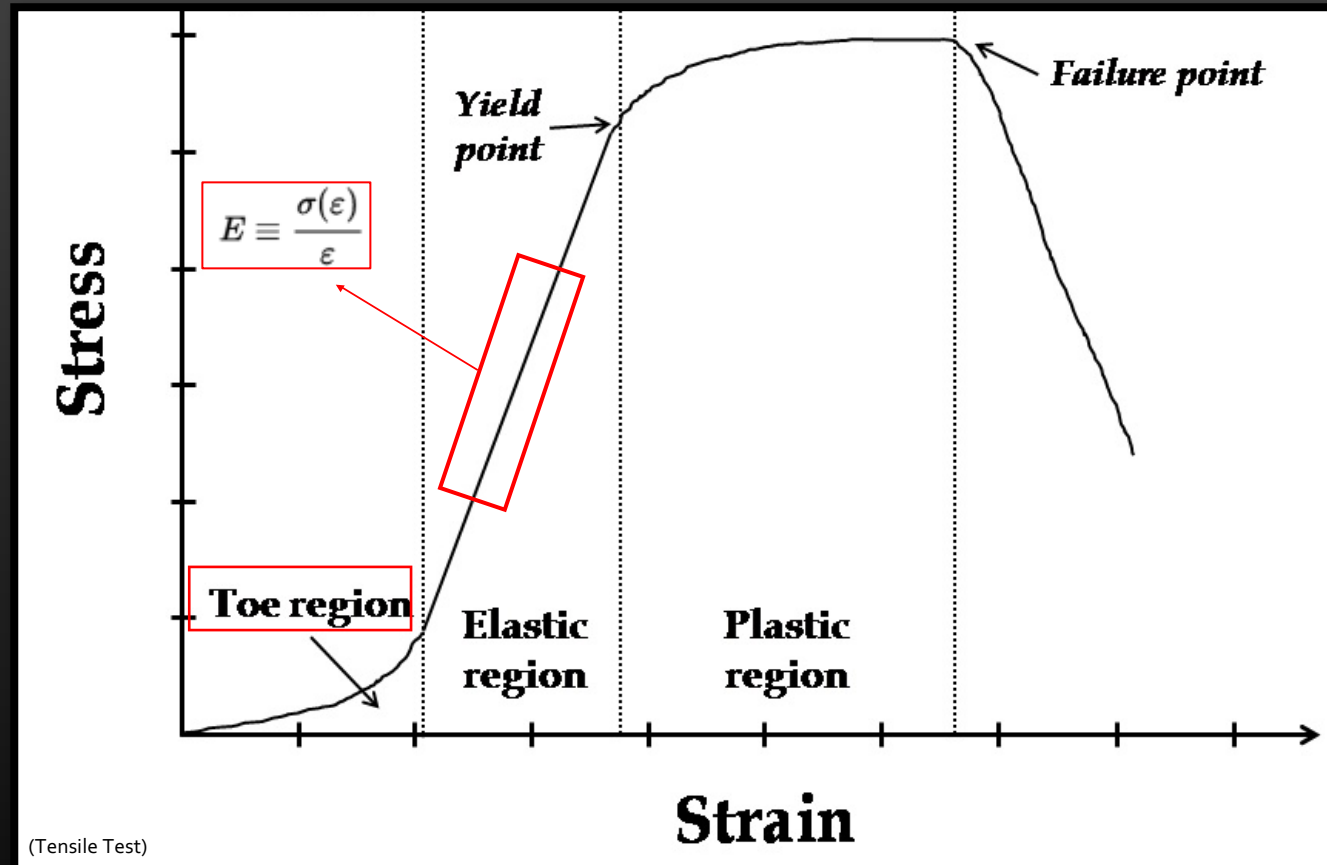


Stress, $\sigma = \frac{\text{Force}}{\text{Cross-Sectional Area}} = \frac{F}{A_0}$

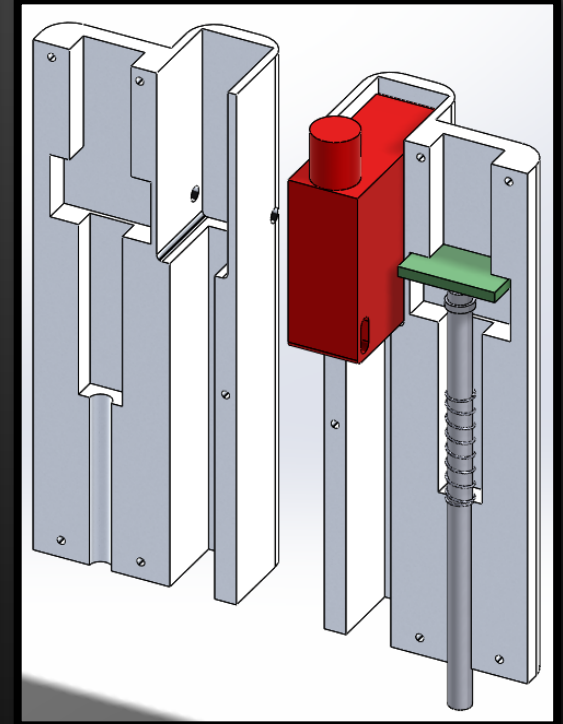
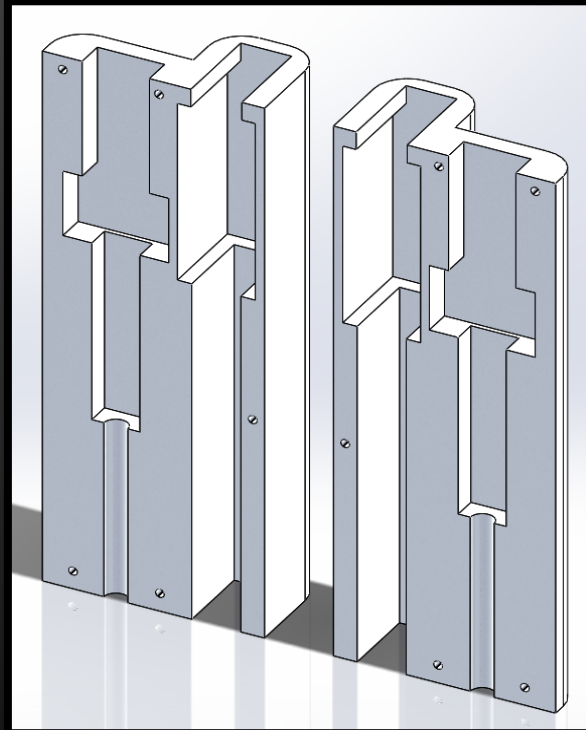
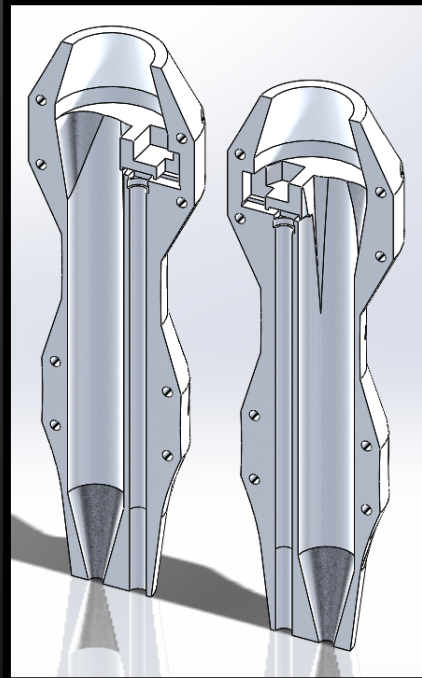
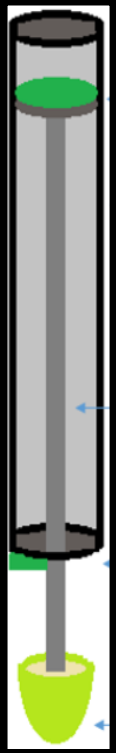


Strain = $\frac{\text{Elongation}}{\text{Original Length}} = \frac{\Delta L}{L_0}$

MODULUS OF ELASTICITY



DESIGN HISTORY



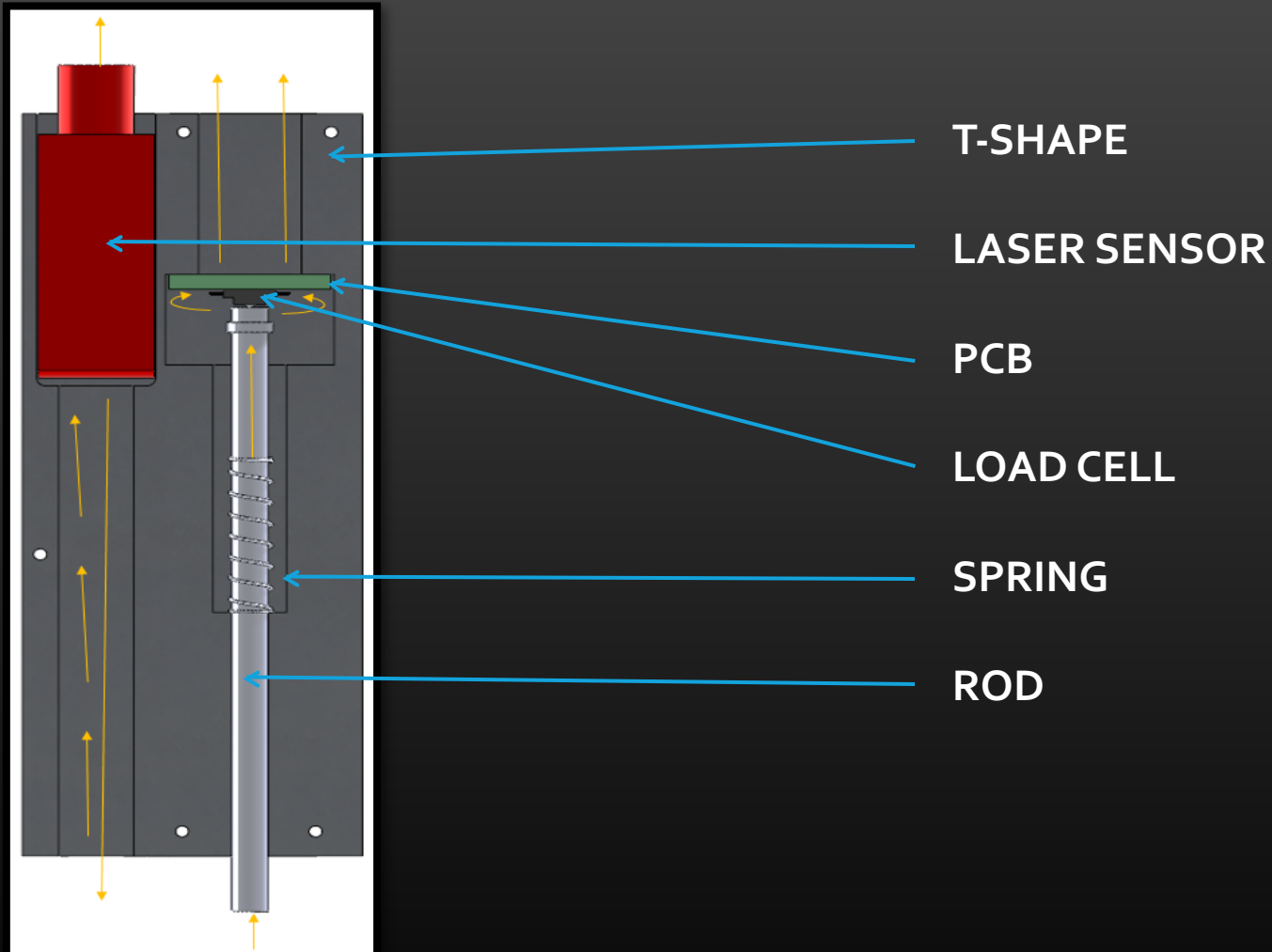
Early Fall

Late Fall

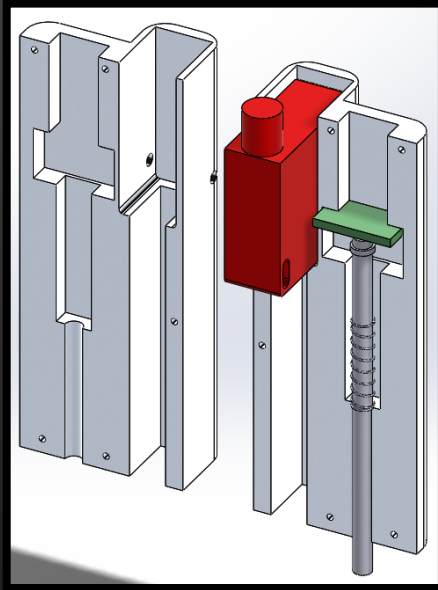
Early Spring

Current Model

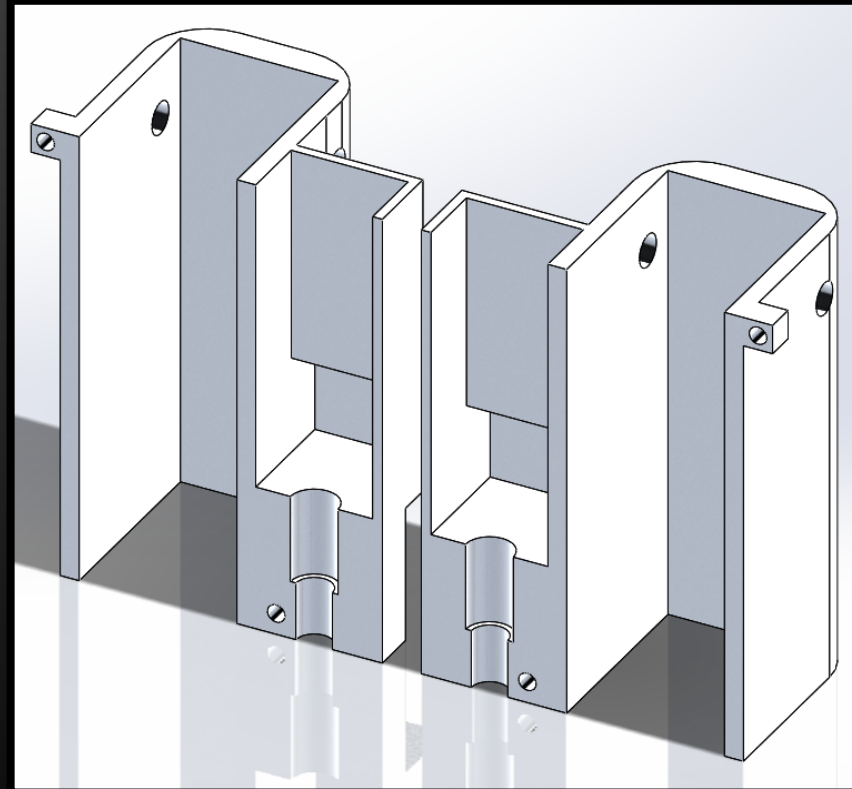
DEVICE: NeuroTouch



DEVICE: NeuroTouch 2.0



NT 1.0



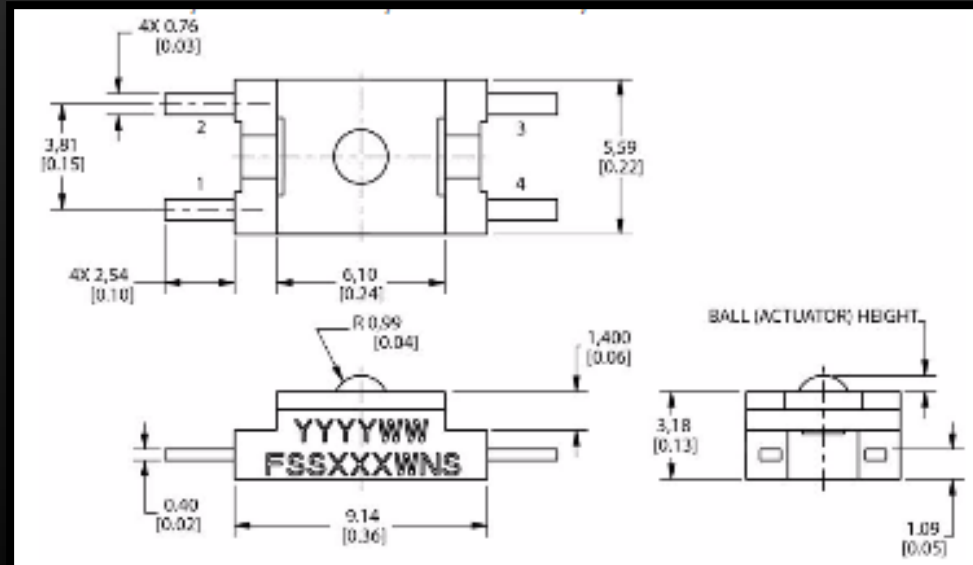
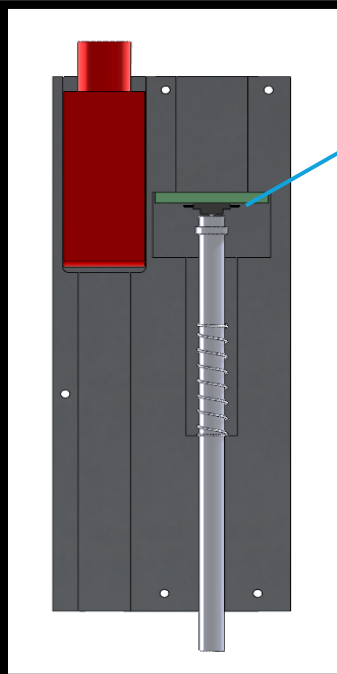
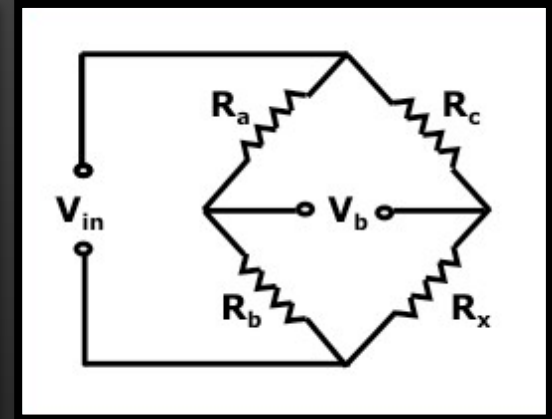
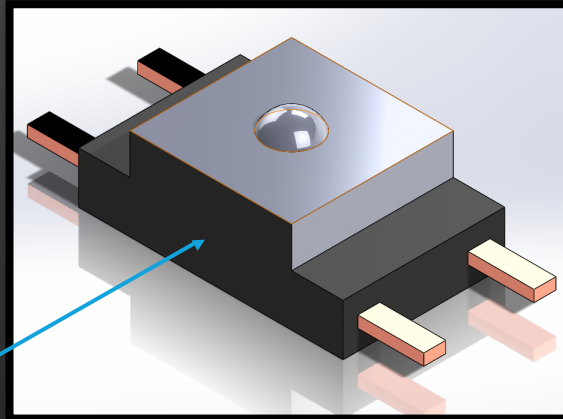
NT 2.0

Updated Features

- More Ergonomic
- Less Material

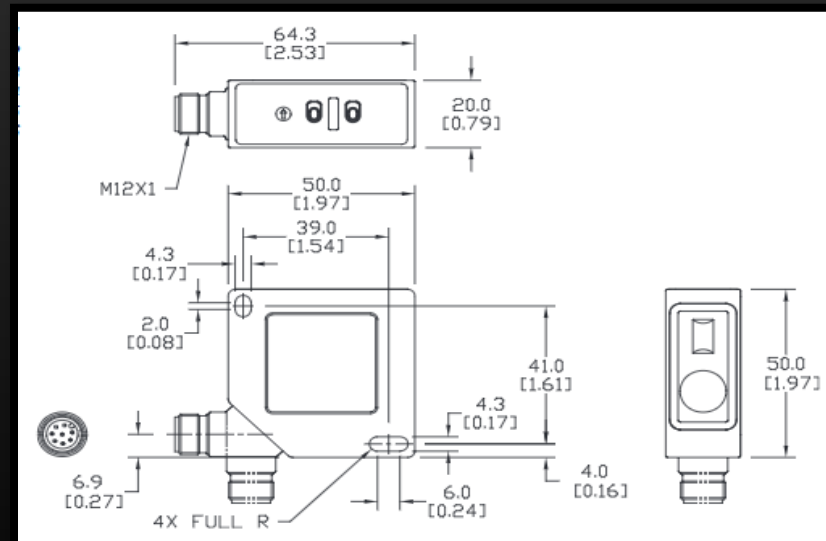
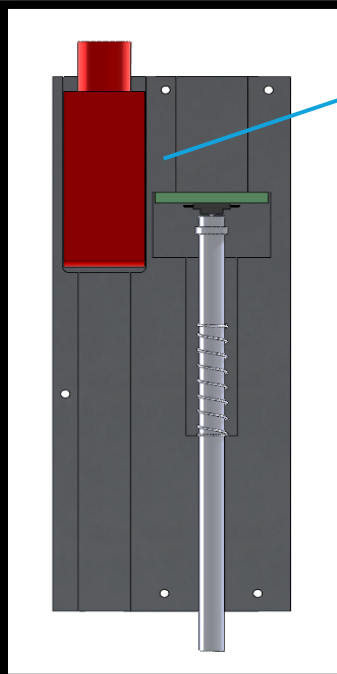
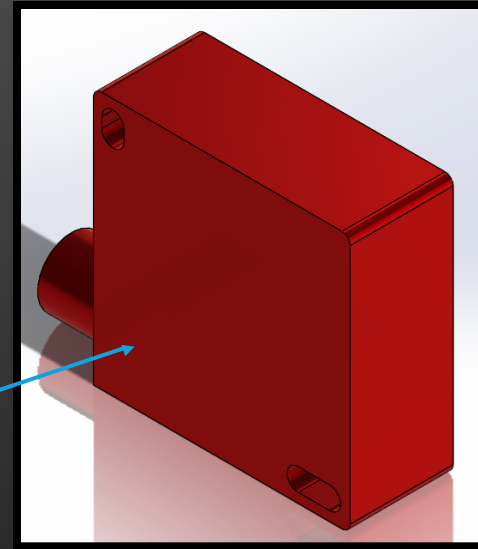
FORCE SENSOR: Load Cell

- Operating Range: 0 – 4.5lbf
- Approximate Pressure: 2 lbs
- Accuracy:
 - Linearity: 0.5%

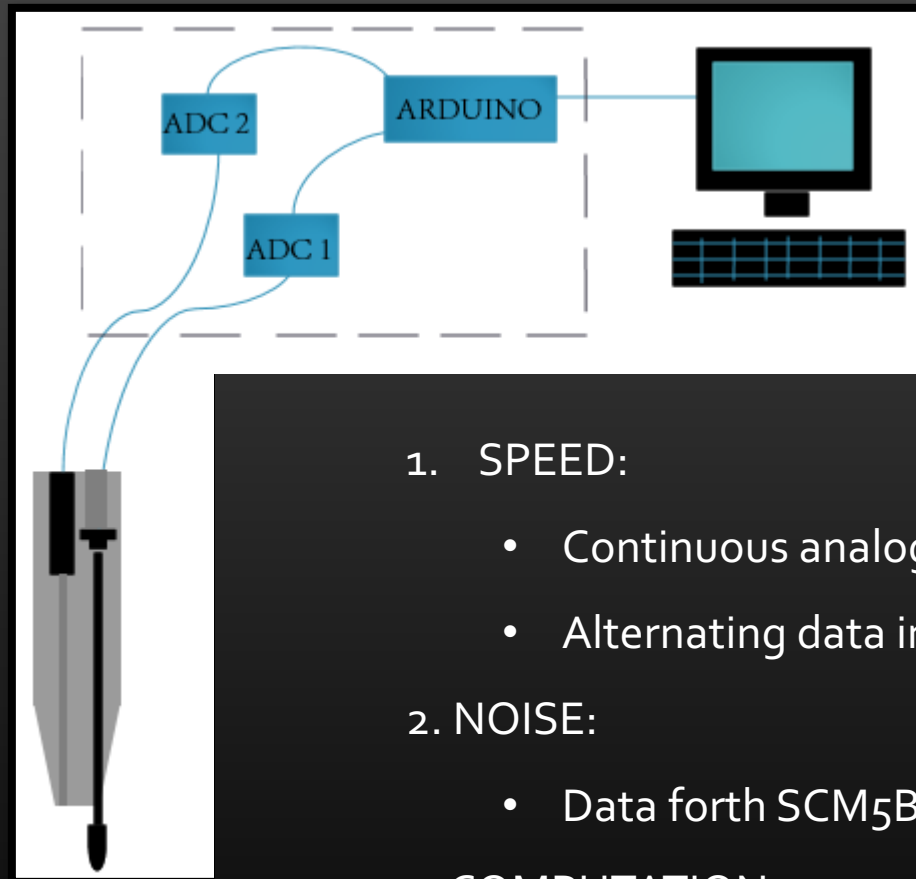


LASER SENSOR

- Relative Displacement: 1 mm
- Accuracy
 - Linearity: 0.15%



ELECTRICAL SYSTEM



1. SPEED:

- Continuous analog, 80 SPS serial interface*
- Alternating data input

2. NOISE:

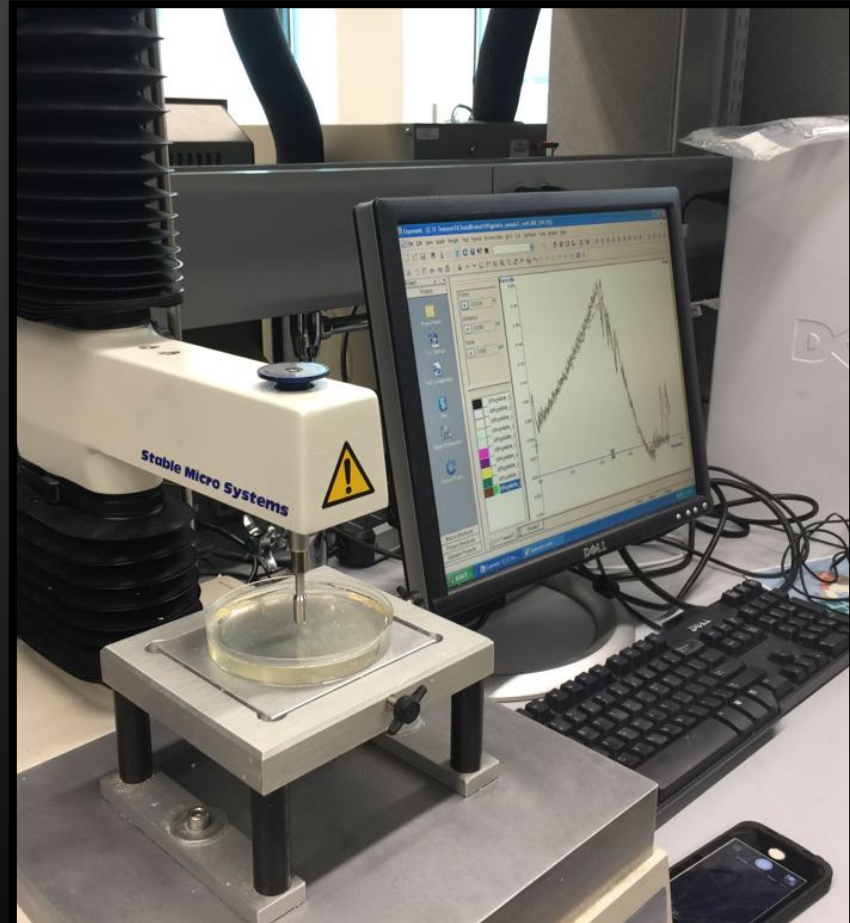
- Data from SCM5B modules

3. COMPUTATION:

- Arduino Uno

TESTING: Polymers

1. Texture Analyzer
2. Agarose vs. Gelatin



NEXT STEPS

1. Software

- Finalize Arduino code

2. Hardware

- Finish wiring and transportation casing
- Machine NeuroTouch 2.0 for Expo

3. Testing

- Finish polymer testing with NeuroTouch 1.0
- Test on sheep brain



EXPO APRIL 28

Thank you

End of presentation

BUDGET

Current cost to make a new device: \$1500

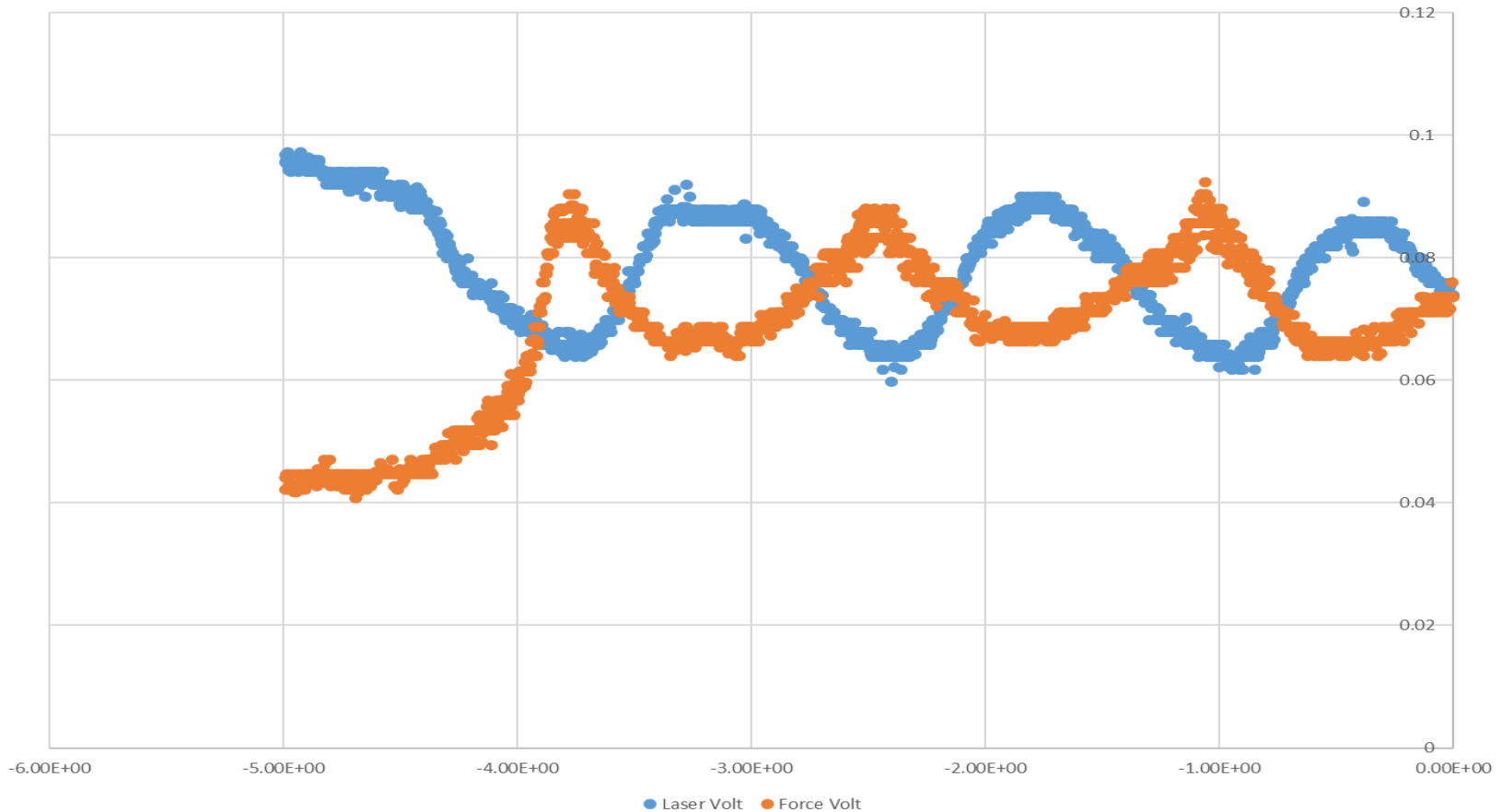
Item	Price	Quantity
STRUCTURAL		
PLA Filament Spool-Amazon	\$16 (provided by NIML)	1
Raw Aluminum	\$40	1
Rod Stainless Steel	Free	1
HARDWARE		
Ultrasonic Sensor (Balluff Analog Output)	\$350-(On loan)	1
Laser Sensor (OPT Short Range) CMOS Series	\$629 (On loan)	1
Load sensor(Honeywell FSS Series)	\$68	1
Voltage Regulator	\$25	1
Accessory PCB	<\$50 for multiple	3-5
Main PCB	Included in above	3-5
Voltage Scaling Components	\$24.49	3
ADC1: ADS1252	\$29.28	2
ADC2: HX711	*Free, on loan from UI	1
5B modules	\$129	2
SOFTWARE		
Arduino Uno	24.95 + shipping and tax (On loan)	1
Polymer Testing Equipment	\$144.52	
Budget = \$3000	Cost for current System = \$716.24	Current Remaining Balance = \$2745

DATA

Orange: Load Cell Indenter

Blue: Laser Sensor Relative Displacement

oscope data



DATA: Determining Modulus of Elasticity

